Claims

1. An assembly for loading a collapsible embolic protection filter into a catheter, the assembly comprising: -

a catheter defining a reception space at a distal end of the catheter for receiving a collapsed embolic protection filter;

a separate removable pushing device for delivering the medical device into the reception space.

2. An assembly as claimed in claim 1 comprising a separate loading device to collapse the embolic protection filter, the loading device defining an inlet end and an outlet end, the outlet end being configured for co-operative alignment with the reception space.

3. An assembly as claimed in claim 1 or 2 wherein the pushing device comprises a proximal stop for engagement with the embolic protection filter.

4. An assembly as claimed in claim 2 wherein the pushing device comprises a stem, the stem having a distal stop for engaging the embolic protection filter.

5. An assembly as claimed in any of claims 1 to 4 wherein the pushing device comprises a handle.

6. An assembly as claimed in any of claims 2 to 5 wherein the loading device comprises means for radially compressing the embolic protection filter.

7. An assembly as claimed in claim 6 wherein the loading device comprises a funnel, the inlet end defining a larger cross sectional area than the outlet end.

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8. An assembly as claimed in claim 7 wherein the loading device comprises a main support having a funnel-shaped bore formed from a frusto-conical embolic protection filter receiving portion terminating in a cylindrical portion formed by a loading tube projecting from the main support for alignment with the reception space before loading.

9. An assembly as claimed in claim 7 or 8 in which the cone angle of the funnel is between 15° and 65°.

10. An assembly as claimed in claim 9 in which the cone angle is between 35° and 45°.

11. An assembly as claimed in any of claims 2 to 10 wherein the loading device extends into the reception space.

12. An assembly as claimed in any of claims 2 to 10 wherein the loading device extends around the outside of the reception space.

13. An assembly as claimed in any of claims 1 to 12 comprising a tray, the tray comprising a first retaining means for releasably supporting the pushing device in a disengaged position before delivering the embolic protection filter into the catheter.

14. An assembly as claimed in claim 13 comprising a second retaining means for releasably supporting the loading device in co-operative alignment with the catheter during loading.

15. An assembly as claimed in claim 13 or 14 wherein the retaining means comprises a channel for receiving the loading device and/or the catheter and/or the pushing device, and at least one projection on the channel wall projecting inwardly for snap retention of the loading device and/or the catheter and/or the pushing device.

16. An assembly as claimed in any of claims 13 to 15 wherein the tray comprises a liquid retaining bath formed by a recess in the tray, the bath having a depth sufficient to accommodate in a totally submerged state the reception space of the catheter and the embolic protection device for submerged loading of the embolic protection filter into the reception space.

17. An assembly as claimed in claim 16 wherein the tray has a catheter holding channel communicating with the bath, the channel defining a pathway around the tray which supports the catheter in a loading position on the tray.

18. An assembly as claimed in claim 17 wherein means for securing the catheter within the channel comprises a number of retainers spaced-apart along the channel, each retainer comprising two or more associated projections which project inwardly from opposite side walls of the channel adjacent a mouth of the channel, the projections being resiliently deformable for snap engagement of the catheter within the channel behind the projections.

19. An assembly as claimed in claims 17 or 18 wherein a ramp is provided at an end of the channel communicating with the bath to direct the reception space of the catheter towards a bottom of the bath.

20. An assembly as claimed in claim 19 wherein means is provided within the bath for supporting the reception space of the catheter above the bottom of the bath.

21. An assembly as claimed in claim 20 wherein said supporting means is a step adjacent the channel.

22. An assembly as claimed in any of claims 16 to 21 wherein the first retaining means is provided within the bath.

23. An assembly as claimed in any of claims 1 to 22 comprising a flushing means.

24. An assembly as claimed in claim 23 wherein the flushing means comprises a syringe.

25. An assembly for loading a collapsible embolic protection filter into a catheter substantially as hereinbefore described with reference to the accompanying drawings.

26. A method of loading an embolic protection filter into a catheter, the method comprising the steps of:-

providing an embolic protection filter, the embolic protection device being collapsible;

providing a embolic protection catheter defining a reception space at a distal end of the catheter for receiving the collapsed embolic protection filter;

providing a pushing device for delivering the embolic protection filter into the reception space;

delivering the embolic protection filter into the reception space using the pushing device; and

removing the pushing device from the reception space.

27. A method as claimed in claim 26 comprising the steps of :

providing a loading device to collapse the embolic protection filter, the loading device defining an inlet end and an outlet end;

aligning the outlet end of the loading device in co-operation with the reception space; and

delivering the embolic protection filter through the inlet end of the loading device and into the reception space.

28. A method as claimed in claim 27 wherein the catheter comprises an internal proximal stop, and the method comprises the step of moving the collapsed embolic protection filter proximally in the reception space using the pushing device to engage the internal proximal stop and disassociate the loaded catheter from the loading device before removing the pushing device.

29. A method as claimed in claim 28 wherein the catheter is constrained relative to the loading device before delivery of the embolic protection filter through the loading device into the reception space, and the method comprises the step of releasing the constraint to facilitate disassociation of the loaded catheter from the loading device.

30. A method as claimed in any of the claims 26 to 29 wherein the pushing device comprises a wire for threading through the embolic protection filter, the wire defining a distal stop for engaging the embolic protection filter.

31. A method as claimed in any of claims 26 to 30 wherein the loading device comprises an elongate neck at the outlet end, and the method

comprises the step of at least partially positioning the elongate neck in the reception space before delivering the embolic protection filter into the reception space.

32. A method as claimed in any of claims 26 to 31 wherein the method comprises the step of flushing the embolic protection filter before delivering the embolic protection filter into the reception space.

33. A method as claimed in any of claims 26 to 32 wherein the method comprises the step of flushing the catheter before delivering the embolic protection filter into the reception space.

34. A method as claimed in any of claims 28 to 33 wherein the catheter comprises an outer catheter tube and an inner catheter tube, the inner catheter tube defining the internal proximal stop.

35. A method as claimed in claim 34 wherein both the inner catheter tube and the outer catheter tube are flushed before delivering the embolic protection filter through the loading device.

36. A method of loading an embolic protection filter into a catheter, the method comprising the steps of : -

providing an embolic protection filter, the embolic protection filter being collapsible;

providing a catheter defining a reception space at a distal end of

the catheter for receiving the collapsed embolic protection filter, the catheter comprising at least one internal proximal stop;

providing a loading device to collapse the embolic protection filter, the loading device defining an inlet end and an outlet end;

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aligning the outlet end of the loading device with the reception space;

delivering the embolic protection filter through the loading device and into the reception space; and

moving the collapsed embolic protection filter towards its proximal end in the reception space to engage said at least one the internal proximal stop and disassociate the loaded catheter from the loading device.

37. A method as claimed in claim 36 wherein the method comprises the steps of :-

providing a pushing device for delivering the embolic protection filter through the loading device and into the reception space, and for engaging the collapsed embolic protection filter with the internal proximal stop; and

removing the pushing device after disassociating the loaded catheter from the loading device.

38. A method as claimed in claim 36 or 37 wherein the pushing device comprises a wire for threading through the embolic protection filter, the wire defining a distal stop for engaging the embolic protection filter.

39. A method as claimed in any of claims 36 to 38 wherein the loading device comprises an elongate neck at the outlet end, and the method comprises the step of at least partially aligning the elongate neck with the reception space before delivering the embolic protection filter through the loading device.

40. A method as claimed in any of claims 36 to 39 wherein the method comprises the step of flushing the embolic protection filter before delivering the embolic protection filter through the loading device.

41. A method as claimed in any of claims 36 to 40 wherein the method comprises the step of flushing the catheter before delivering the embolic protection filter into the reception space.

42. A method as claimed in any of claims 36 to 41 wherein the catheter comprises an outer catheter tube and an inner catheter tube, the inner catheter tube defining the internal proximal stop.

43. A method as claimed in claim 41 or 42 wherein both the inner catheter tube and the outer catheter tube are flushed before delivering the embolic protection filter through the loading device.

44. A method of loading a embolic protection filter into a catheter substantially as hereinbefore described with reference to the accompanying drawings.

45. A removable device for loading a collapsible embolic protection filter into a catheter, the device comprising a distal stop for releasably engaging with the embolic protection filter to push the embolic protection filter towards a proximal end of a catheter thereby loading the embolic protection filter into the catheter.

46. A device as claimed in claim 45 wherein the distal stop is provided on an elongate stem.

47. A device as claimed in claim 46 wherein the distal stop is integral with the stem.

48. A device as claimed in claim 47 wherein the distal stop comprises a step in the stem from a small diameter portion proximal of the step to a large diameter portion distal of the step.

49. A device as claimed in claim 48 wherein the small diameter portion has a diameter of approximately 0.014" (0.3556 mm).

50. A device as claimed in claim 48 or 49 wherein the large diameter portion has a diameter of approximately 0.018" (0.4572 mm).

51. A device as claimed in claim 46 wherein the distal stop is attached to the stem.

52. A device as claimed in any of claims 46 to 51 wherein the stem comprises a wire.

53. A device as claimed in any of claims 46 to 52 wherein the stem comprises a low friction coating for ease of threading through the medical device.

54. A device as claimed in claim 53 wherein the coating is of polytetrafluoroethylene.

55. A device as claimed in any of claims 45 to 54 wherein the device comprises a handle.

56. A removable device for loading a collapsible embolic protection filter into a catheter substantially as hereinbefore described with reference to the accompanying drawings.